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GLENWOOD SEWAGE TREATMENT PLANT

Illinois University
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ANNUAL REPORT OF THE GLENWOOD SEWAGE TREATMENT PLANT

In the previous annual report we described the plant at Glenwood and its mode of operation so we shall not repeat it here. In the Table below we give the daily average results for each month from April 1965 to April 1967. These data include the daily average flow, the BOD's of the raw sewage and the effluent, the nitrate content of the effluent and the nitrate removals. Other data were collected during the year but the ones listed convey the story of what has transpired.

GLENWOOD SEWAGE PLANT DATA APRIL 1966 TO APRIL 1967 MONTHLY AVERAGE VALUES

MONTH	FLOW OF GALLONS PER DAY	BOD ppm		NITRATE EFFLUENT PPM	NITROGEN REMOVAL %
		RAW	EFFLUENT		
April	611,830	90	14	6.8	22
May	573,400	90	12	8.2	20
June	443,800	107	11	1.2	64
July	405,400	115	8	2.2	70
August	409,000	143	4	1.9	76
September	357,700	131	6	8.8	54
October	385,900	212	7	11.2	44
November	370,200	160	6	15.3	26
(1-27)					
November	365,000	175	22	15.7	47
(27-30)					
December	364,400	244	55	4.4	53
January	351,700	188	45	1.8	55
February	346,100	Sampler out of order			
March	472,000	183	38	2.5	57
April	532,000	144	28	1.1	70

In the annual report for last year we made note of the high flow of waste. The plant was designed for a normal flow of 240,000 gallons of waste per day and a maximum of 400,000 gallons. Last year due to a large amount of infiltration into the city sewers the flow was generally over

600,000 gallons per day and at times went as high as 1,000,000 gallons. With this high flow we were not able to operate the plant as it should so the data for that year were of little value. We notified the City Council that unless this high infiltration could be corrected we would have to discontinue our studies. As a result they engaged an engineer to make a survey of the sanitary sewer system and in this survey they did find one place where the storm sewer was broken and a steady stream of spring water flowed from this broken sewer into the sanitary sewer. When this was corrected the flow decreased about 75 gallons per minute (100,000 gallons per day) but there still was too much flow for a proper functioning of the plant. After considerable effort it was found that the lake level was about two feet above normal and in fact about four feet above the level of many of the sanitary sewers. There was a seepage from the lake into the sanitary sewer system. We contacted the State Conservation Commission and they inspected the outlet and found that the carp trap there was clogged with weeds so the lake was kept above normal level. When this was corrected the sewage flow dropped below 400,000 gallons per day but did not go down to the normal dry weather flow of 240,000 gallons that should exist in this community. It is not likely that the flow can be brought down much more unless considerable effort and expense is incurred to correct the matter.

At the present flow it is possible to get some useful data. This is indicated in the table above. It is to be noted in these data that from June on until March of 1967 when the spring thaw set in, the flow was generally below the 400,000 gallons.

On occasional days the flow did exceed this value because of storm water. We discovered that a few of the store buildings had their roof drains connected to the sanitary sewers and therefore during a rain the flow did

rise considerably. We have asked the City Council to correct this but this has not been done as yet.

For a month or more during the wet spring weather the flow will exceed the maximum for which the plant was designed and therefore during this period we are not going to get good operating results. The bottle neck in the plant is the final settling tank. When the flow is heavy we do not get proper settling and a considerable amount of solids escapes with the final effluent. Since it seems that the City is not going to be able to get the flow down to what should be normal for this community we have now asked the City Council to construct another final settling tank the same size as the one they now have. This will cost them about \$20,000. They seem favorably inclined to do this since it will be less expensive to do this than to find all the leaks in the sanitary sewers and correct the infiltration. If this can be done we should be able to get reasonably good results even when the flow goes as high as 600,000 gallons per day. It is still not ideal because the raw sewage will be weak and it is more difficult to show good results with this weak sewage than with some having a normal strength.

Even though the flow was high most of the year we were nevertheless able to conduct some runs that gave us some useful data. From June through August we operated the brushes at a rather shallow emersion so as to reduce the aeration to the bare minimum. It can be noted that during this time the nitrate content of the final effluent was rather low and during this time we had a reasonably good removal of total nitrogen from the sewage. From August through November we set the brushes deeper and maintained a fairly high level of dissolved oxygen. During this period we had a rather high nitrate content in the final effluent and a relatively poor removal of

total nitrogen. We believe these data show that to get the best possible removal of total nitrogen it is best to operate such plants with a dissolved oxygen level close to zero.

The last days of November, in fact on November 27, something happened to the sewage that killed off our culture in the sludge. Some toxic substance must have been discharged into the sewage because all the small sewage worms were killed as the protozoa and perhaps also many of the bacteria. The result was that we obtained a very light flock and most of this escaped into the final effluent.

The presence of this toxic material has continued ever since and we do not know as yet what it is. A new metal plating plant was put into operation during the summer of 1966 and we thought it might be discharging cyanide or toxic metals into the sewage but on looking into this matter we found that this plant does not discharge their waste into the city sewer but instead puts it into a septic tank and a soil drainage field. We then thought the water from this drainage field was finding its way into the sanitary sewers and therefore took samples of water from several of the sewers and had these tested by the Twin City Testing Laboratory. They found no evidence of toxic material that could have come from this plating plant.

To demonstrate that there is some toxic material present we have taken water from several of the sewers and have used these to make bacterial plating media. In this media we deliberately put in a very small amount of nutrients because it is easier to demonstrate inhibiting substances if the nutrient concentration for the bacteria is very low. When we make streak plates or pour plates on this media with some standard organism such as E. coli or B. cereus we find that while we get normal growth on the control media we get no growth or very little growth on the media made particularly from one

of the branches of the sanitary sewers that enter the sewage treatment plant.

In a recent test we evaporated some of this water to almost dryness and then added back distilled water to the original volume before evaporation. When media was made from this we had very little evidence of inhibition. Also in another sample we dried the material to dryness and ashed the residue. This dry material was then added back to distilled water and when this was made into media there was no evidence of inhibition. It looks as though the toxic material is more volatile than water and we shall follow this up to see if we can find what it is and then try to find the source. If we are to obtain results from our study next year we must correct this.

It was pointed out in our last report that at the plant at Glenwood it is difficult to maintain the dissolved oxygen at a low level and at the same time get adequate movement of the water in the ditch, enough to prevent the solids from settling. The water should move at about 1 foot per second. During the period from June 1966 to September when we did maintain a low oxygen level we really did not have enough velocity to prevent settling of solids at certain points. It was for this reason that we asked for supplementary funds to have designed and built some special propulsion equipment so that we would be able to control motion of the liquid and aeration independently. This equipment has now been designed and the drawings have been submitted to fabricators for bids. It is planned to have these in operation by the first of July. If we can have the toxic material removed by that time we should be in a position to have a year's operation of the plant in which we hope to get the kind of results we have been looking for these past two years.